Remarks

The Office Action mailed February 7, 2003 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-20 are now pending in this application. Claims 1-5 are withdrawn from consideration. Claims 6-20 stand rejected. Claim 8 is cancelled by this amendment.

Reconsideration of the restriction requirement imposed under 35 U.S.C. § 121 is respectfully requested.

A restriction to either invention I, consisting of claims 1-5 drawn to method for generating thrust from a gas turbine engine, classified in Class 60, subclass 776, or invention II, consisting of claims 6-20, drawn to a pulse detonation system for a gas turbine engine, classified in class 60, subclass 247, was imposed. In response, Applicants confirm the election made by telephone on February 4, 2003, with traverse to prosecute the invention of Group II, claims 6-20.

The requirement for election is traversed because the inventions set out by the claims in Groups I and II are clearly related. Applicants submit that a thorough search and examination of either Group would be relevant to the examination of the other Group and would not be a serious burden on the Examiner. Additionally, requirements for election are not mandatory under 35 U.S.C. 121. Accordingly, reconsideration of the election requirement is requested.

The objection to the drawings under 37 C.F.R. 1.83(a) is respectfully traversed. Under 37 C.F.R. 1.83(a), features disclosed in the description and claims need not be shown in the drawings where their detailed illustration is not essential for a proper understanding of the invention. Applicants respectfully submit that an artisan of ordinary skill in the art, after reading the specification in light of the Figures, would understand the geometries of the detonation and deflagration chambers as recited in the claims and described in the specification. More specifically, a cross-section of the detonation chamber is illustrated in both Figures 1 and 2. Applicants respectfully submit that one skilled in the art would understand such two-dimensional

representations, and after reading the specification in light of the figures, would understand the geometries recited in Claims 11, 12, 13, 16, 17, and 19, requiring only a rotation of the cross-section about an axis for a three dimensional representation. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would understand the geometry and orientation of each of these engine configurations. For the reasons set forth above, Applicants respectfully request the objection to the drawings be withdrawn.

The objection to the specification is respectfully traversed. Specifically, the parenthetical phrase "(not shown)" has been deleted from the last sentence in paragraph 9. Accordingly, Applicants request that the objection to the specification be withdrawn.

The rejection of Claims 6 to 20 under 35 U.S.C. § 112, first paragraph, is respectfully traversed.

The pulse detonation system recited within Claims 6-20 includes the use of deflagration chambers and a detonation chamber to detonate a fuel mixture to augment thrust. The structure of these chambers are clearly illustrated in the drawings and described in the specification, for example at paragraphs 14 and 15. Applicants respectfully submit that one skilled in the art, after reading the Claims, in light of the Figures and specification, would understand the recitations of Claims 6 and 14 of "a deflagration chamber radially outward from an engine exhaust centerbody" and "a detonation chamber in flow communication with said deflagration chamber".

Similarly, Applicants respectfully submit that one of ordinary skill in the art would understand a vaneless radial nozzle. For example, U.S. Patents 5,809,772 to Giffin, III, et al., 5,404,713 to Johnson, and 4,961,310 to Moore et al. are each directed to gas turbine engines that include vaneless nozzles and radial nozzles, many of which also include schematic representations. Furthermore, Applicants submit that the term "critical pressure ratio" is one of several gas constants and pressure ratios commonly associated with gas flow, and more particularly with respect to flow through a nozzle.

The Federal Circuit has opined in *Verve LLC v. Crane Cams, Inc.*, 65 USPQ 2d 1051, 1053-1054 (Fed. Cir. 2002), that "[p]atent documents are written for persons familiar with the relevant field; the patentee is not required to include in the specification information readily understood by practitioners, lest every patent be written as a comprehensive tutorial and treatise for the generalist, instead of a concise statement for persons in the field." Moreover, the Federal Circuit has made clear that patents are not required to be written as comprehensive tutorial and treatise for the generalist, but are rather are written as a concise statement for persons in the field. *Verve LLC v. Crane Cams, Inc.*, 65 USPQ 2d 1051, 1053-1054 (Fed. Cir. 2002). As such, with respect to paragraph 19, paragraph 19 recites "[F]uel is supplied to the deflagration chamber 100 such that chamber 100 is operated in a fuel-rich mode of operation". The specification, however, must be taken as a whole, rather than analyzed only sentence by sentence to determine whether the requirements of Section 112, first paragraph, are met. More specfically, the entire application should be considered in determining whether the written description requirements of Section 112 are met (see MPEP § 2163). For example, in contrast to the assertion within the Office Action that combustion is initiated in the absence of oxygen, the specification recites at paragraph 14, for example, that "[D]eflagration chamber 100 is coupled in flow communication with a fuel source (not shown) and an air source (not shown) used for atomization".

Furthermore, with respect to the ignition source within the detonation chamber, Applicants respectfully submit that an artisan of ordinary skill in the art would understand the structural and operational parameters that determine whether deflagration combustion or detonation combustion occurs, and after reading the specification, in view of the Figures, would understand the invention as described and claimed. More specifically, Applicants submit that such an artisan, after reading the specification in view of the Figures, would understand the combustion process within the gas turbine engine, including the detonation process.

Accordingly, for at least the reasons set forth above, Applicants respectfully request that the Section 112, first paragraph, rejections of Claims 6-20 be withdrawn.

The rejection of Claims 14 to 20 under 35 U.S.C. § 112, second paragraph, is respectfully traversed.

Claim 14 has been amended to delete the term "turbofan" thus providing proper antecedent basis for the recitations of the claim. Accordingly, Applicants respectfully request that the Section 112, second paragraph, rejections of Claims 14-20 be withdrawn.

The rejection of Claims 6 to 17, 19, and 20 under 35 U.S.C. § 102(b) as being anticipated by Jonker (U.S. Patent No. 2,635,420) is respectfully traversed.

Jonker describes a constant pressure engine including an auxiliary pulse jet engine. The constant pressure engine includes a stationary shell 16 and annular tubular partitions 17 and 18 that provide concentric annular air streams. A first radially inner stream flows within partitions 17 and 18 and shell 16, and a second radially outer stream flows outside of partitions 17 and 18 and within shell 11, and is discharged through pipes 19 coupled about shell 16. The auxiliary air stream from pipes 19 flows into an annular channel that is defined between shells 26 and 27 and is supported on an engine shell 23. The air is then discharged past a convergent section defined between frusto-conical shells 28 and 29, such that the outflow is controlled by a slide valve 30. The auxiliary pulse jet engine includes a plurality of combustion chambers 33 arranged annularly about pipe 31. Combustion air is supplied to the pulse jet engine through pipes 19.

Claim 6 recites a pulse detonation system for a gas turbine engine, the pulse detonation system configured to create a temperature rise and a pressure rise within the gas turbine engine and to increase gas turbine engine thrust, the pulse detonation system including "at least one deflagration chamber radially outward from an engine exhaust centerbody; and a detonation chamber in flow communication with said deflagration chamber, said detonation chamber configured to detonate a fuel mixture".

Jonker does not describe or suggest a pulse detonation system for a gas turbine engine, the pulse detonation system configured to create a temperature rise and a pressure rise within the

gas turbine engine and to increase gas turbine engine thrust, wherein the pulse detonation system includes at least one deflagration chamber radially outward from an engine exhaust centerbody, and a detonation chamber in flow communication with the deflagration chamber, wherein the detonation chamber is configured to detonate a fuel mixture. Specifically, Jonker does not describe or suggest a detonation chamber positioned in flow communication with a deflagration chamber. Rather, Jonker describes an engine including a plurality of auxiliary combustion chambers that have no detonation chamber component. For the reasons set forth above, Claim 6 is submitted to be patentable over Jonker. Claims 7 and 9-13 depend, directly or indirectly, from independent Claim 6. When the recitations of Claims 7 and 9-13 are considered in combination with the recitations of Claim 6, Applicants submit that dependent Claims 7 and 9-13 likewise are patentable over Jonker.

Claim 14 recites a gas turbine engine including "an inlet portion; an exhaust portion positioned co-axially with said inlet portion; ...and a pulse detonation system positioned between said inlet portion and said exhaust portion, said pulse detonation system ... said pulse detonation system comprising: at least one deflagration chamber radially outward from said engine exhaust centerbody; and a detonation chamber downstream from and in flow communication with said at least one deflagration chamber, said detonation chamber configured to detonate a fuel-air mixture".

Jonker does not describe or suggest a gas turbine engine including an inlet portion, an exhaust portion positioned co-axially with the inlet portion, and a pulse detonation system positioned between the inlet portion and the exhaust portion, the pulse detonation system including at least one deflagration chamber radially outward from the engine exhaust centerbody, and a detonation chamber downstream from and in flow communication with the at least one deflagration chamber, the detonation chamber configured to detonate a fuel-air mixture. Specifically, Jonker does not describe or suggest a detonation chamber positioned downstream from and in flow communication with a deflagration chamber. Rather, Jonker describes an engine including a plurality of auxiliary combustion chambers that have no detonation chamber

component. For the reasons set forth above, Claim 14 is submitted to be patentable over Jonker. Claims 15-17, 19, and 20 depend, directly or indirectly, from independent Claim 14. When the recitations of Claims 15-17, 19, and 20 are considered in combination with the recitations of Claim 14, Applicants submit that dependent Claims 15-17, 19, and 20 likewise are patentable over Jonker.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 6 -17, 19, and 20 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

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PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Koshoffer et al.	:	
	:	Art Unit: 3746
Serial No.: 10/026,162	:	
	:	Examiner: Koczo Jr., Michael
Filed: December 21, 2001	:	
	:	
For: Methods and Apparatus for Operating Gas Turbine Engines	:	

SUBMISSION OF MARKED UP SPECIFICATION AND CLAIMS

Hon. Commissioner for Patents
Box NON-FEE AMENDMENT
Washington, D.C. 20231

Sir:

In furtherance of the response to the Office Action dated February 7, 2003, Applicants hereby submit marked up versions of the amendments made therein in accordance with 37 C.F.R. §1.121(b)(1)(iii) and §1.121(c)(1)(ii).

IN THE SPECIFICATION

Please delete paragraph [0009] beginning on page 2 and ending on page 3, and replace with the following replacement paragraph:

[0009] Figure 1 is a cross-sectional side view of a gas turbine turbofan engine 10 including a pulse detonation system 12 in a first mode of engine operation. Figure 2 is an enlarged partial cross-sectional side view of engine 10 in a second mode of engine operation. In one embodiment, engine 10 is an F110 engine

and is available from General Electric Aircraft Engines, Cincinnati, Ohio. Engine 10 has a generally longitudinally extending axis or centerline 14 extending from an inlet end 16 of engine 10 aftward to an exhaust end 18 of engine 10. Engine 10 includes a core engine 30 which includes a high pressure compressor 34, a combustor 36, a high pressure turbine 38, and a power turbine or a low pressure turbine 40, all arranged in a serial, axial flow relationship. Engine 10 also includes a bypass duct 42 surrounding the core engine 30. In alternative embodiments, engine 10 also includes a core fan assembly [(not shown)].

IN THE CLAIMS

Please cancel Claim 8.

6. (once amended) A pulse detonation system for a gas turbine engine, said pulse detonation system configured to create a temperature rise and a pressure rise within the gas turbine engine and to increase gas turbine engine thrust, said pulse detonation system comprising:

at least one deflagration chamber radially outward from an engine exhaust centerbody; and

a detonation chamber in flow communication with said deflagration chamber, said detonation chamber configured to detonate a fuel mixture.

9. (once amended) A pulse detonation system in accordance with Claim [8] 6 wherein said detonation chamber downstream from said deflagration chamber.

10. (once amended) A pulse detonation system in accordance with Claim [8] 6 further comprising a reversed flap configured to translate axially from a first position during a first engine operating mode to a second position during a second engine operating mode.

11. (once amended) A pulse detonation system in accordance with Claim [8] 6 wherein said detonation chamber is semi-toroidal.

14. (once amended) A gas turbine engine comprising:

an inlet portion;

an exhaust portion positioned co-axially with said inlet portion;

a centerline axis of symmetry;

an exhaust centerbody concentrically aligned with said exhaust portion and extending axially along said centerline axis of symmetry into said exhaust portion; and

a pulse detonation system positioned between said [turbofan] inlet portion and said [turbofan] exhaust portion, said pulse detonation system configured to create a temperature rise and a pressure rise within said [turbofan] engine and to increase [turbofan] engine thrust, said pulse detonation system comprising:

at least one deflagration chamber radially outward from said engine exhaust centerbody; and

a detonation chamber downstream from and in flow communication with said at least one deflagration chamber, said detonation chamber configured to detonate a fuel-air mixture.

19. (once amended) A gas turbine engine in accordance with Claim 15 wherein [said pulse detonation system further comprises a detonation chamber downstream from and in flow communication with said at least one deflagration chamber,] said detonation chamber is semi-toroidal [and is configured to detonate a fuel-air mixture].

20. (once amended) A gas turbine engine in accordance with Claim [19] 15 wherein said pulse detonation system further comprises a reversed flap configured to translate axially from a first position during a first engine operating mode to a second position during a second engine operating mode.

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